



K. Critical Area Calculations

For purposes of estimating take under the FPHCP, protection of riparian zones and unstable slopes was identified as important to the long-term conservation of covered species. Riparian zones adjacent to Type S, F, and Np waters and high hazard unstable slopes were identified as “critical areas” in the take assessment. This appendix documents the values and calculations used in establishing the extent of critical areas under the “minimal effects” and FPHCP strategies.

Riparian Zones

The extent of riparian zones under each strategy was determined by multiplying the riparian zone width by the protected (i.e., buffered) channel length for each water type. The riparian zone width was the sum of the bankfull width, channel migration zone width (for Type S and F waters), and riparian buffer width. Most riparian buffer widths were a function of site index. Under the “minimal effects” strategy, riparian buffer widths adjacent to Type S and F waters were the average of the site class II and site class III 250-year site indexes (Table 1). Riparian buffers along Type Np waters under the “minimal effects” strategy were equal in width to the site class III 100-year site index (Table 1). Under the FPHCP strategy, riparian buffer widths for Type S waters were not a function of site index, but were based on the 200-foot Shoreline Management Zone required by the Shoreline Management Act. Riparian buffer widths adjacent to Type F waters under the FPHCP strategy were equal to the average of the site class II and site class III 100-year site indexes while riparian buffers along Type Np waters were 50 feet wide (Table 1).

With the exception of Type Np waters under the FPHCP strategy, 100 percent of the Type S, Type F, and Type Np channel length was protected (i.e., buffered) under both strategies. The proportion of the Type Np channel length protected under the FPHCP strategy was a function of required riparian management zone and sensitive site buffering. The assessment assumes that in western Washington, 50 percent of the Type Np length is buffered. In eastern Washington, the assessment assumes that 60 percent of all harvest units are clearcut; Type Np waters within these clearcut units are buffered along 100 percent of their length. The assessment assumes the remaining 40 percent of harvest units are partial-cut; 50 percent of the length of Type Np waters within partial-cut units is buffered.

Bankfull widths and channel migration zone widths are reported in Table 2 and were taken from Appendix C of the Draft Environmental Impact Statement (DEIS; Riparian Modeling). In the DEIS, average channel migration zone widths for Type S and F waters were estimated and applied to the entire length of the Type S and F network (Table 2). In reality, however, channel migration zone distribution is patchy and widths are extremely variable. The values used are intended to reflect the total area protected by channel

migration zones as opposed to a true estimate of their width. Riparian zone widths for each water type and corresponding water type lengths were multiplied to estimate the riparian zone critical area acres (Table 3).

Unstable Slopes

The DEIS estimates that 5.9 percent and 4.2 percent of covered lands in western and eastern Washington, respectively, consist of high hazard unstable slopes and landforms susceptible to shallow-rapid landsliding (Appendix E, Unstable Slopes Modeling). These estimates were based on application of a GIS-based slope-morphology model to a representative sample of covered lands. Since the model does not predict susceptibility to deep-seated landslide processes, it is likely that these figures underestimate the true extent of high hazard slopes and landforms statewide. The total covered lands area in western and eastern Washington was multiplied by the corresponding percentage to estimate unstable slope critical area acres (Table 4).

Critical Areas

Total critical area extent under each strategy was determined by adding riparian zone critical area acres and unstable slope critical area acres (Table 5). The “minimal effects” critical area encompasses about 2.6 million acres; the FPHCP provides protection for almost 2.1 million of the “minimal effects” critical area acres. Critical area extent under the FPHCP strategy is expressed as a percentage of “minimal effects” critical area extent in Table 5.

Table 1. 250- and 100-year site indexes for site classes II and III for western and eastern Washington (in feet).

	Western WA	Eastern WA
250 Year SPTH - Site Class II	210	170
250 Year SPTH - Site Class III	174	135
100 Year SPTH - Site Class II	170	110
100 Year SPTH - Site Class III	140	90

Table 2. Assumed channel migration zone (CMZ) widths and bankfull widths for Type S, F, and Np waters in western and eastern Washington (in feet).

	Western WA			Eastern WA		
	Type S	Type F	Type Np	Type S	Type F	Type Np
CMZ Width	30	10	---	5	2	---
Bankfull Width	60	10.5	5	50	7.5	5

Table 3. Water type lengths, riparian zone widths, and riparian zone areas for the “minimal effects” and Forest Practices Habitat Conservation Plan (FPHCP) strategies used in the assessment of “take” under the Federal Endangered Species Act.

	Water Type Length (miles)			Riparian Zone Width (rounded to the nearest whole foot)			Riparian Zone Area ¹ (in acres – includes both sides of stream)		
	Type S	Type F	Type Np	Type S ²	Type F ³	Type Np ⁴	Type S	Type F	Type Np
Minimal Effects Strategy									
Western WA	6,464	22,447	7,685	252	207	143	394,892	1,127,792	265,482
Eastern WA	1,189	5,821	2,792	183	158	93	52,604	223,315	62,608
Total	7,653	28,268	10,477	-----	-----	-----	447,496	1,351,106	328,090
FPHCP Strategy									
Western WA	6,464	22,447	7,685 ⁵	230	170	53	360,417	926,449	48,905
Eastern WA	1,189	5,821	2,792 ⁵	225	106	53	64,855	149,229	28,428
Total	7,653	28,268	10,477	-----	-----	-----	425,272	1,075,678	77,332

1 – Acreage figures may not reflect the product of water type length and riparian zone width due to rounding of riparian zone width figures.

2 – Type S riparian zone widths under the “minimal effects” strategy equal the sum of the following: average of Site Class II and Site Class III 250-year site index (192 feet in western WA and 153 feet in eastern WA), CMZ width (30 feet in western WA and 5 feet in eastern WA), and ½ bankfull width (bankfull width is 60 feet in western WA and 50 feet in eastern WA); Type S riparian zone widths under the FPHCP strategy equal the sum of the following: 200-foot Shoreline Management Zone (includes CMZs where they exist) and ½ bankfull width

3 – Type F riparian zone widths under the “minimal effects” strategy equal the sum of the following: average Site Class II and Site Class III 250-year site index (192 feet in western WA and 153 feet in eastern WA), CMZ width (10 feet in western WA and 2 feet in eastern WA, applied to all Type F waters), and ½ bankfull width (bankfull width is 10.5 feet in western WA and 7.5 feet in eastern WA); Type F riparian zone widths under the FPHCP strategy equal the sum of the following: average Site Class II and Site Class III 100-year site index (155 feet in western WA and 100 feet in eastern WA), CMZ width, and ½ bankfull width

4 – Type Np riparian zone widths under the “minimal effects” strategy equal the sum of the following: Site Class III 100-year site index (140 feet in western WA and 90 feet in eastern WA) and ½ bankfull width (bankfull width is 5 feet in both western and eastern WA); Type Np riparian zone widths under the FPHCP strategy equal the sum of the following: 50-foot RMZ and ½ bankfull width

5 – The assessment assumes that in western Washington, 50 percent of the Type Np length is buffered. In eastern Washington, the assessment assumes that 60 percent of all harvest units are clearcut; Type Np waters within clearcut units are buffered along 100 percent of their length. The assessment assumes the remaining 40 percent of harvest units are partial-cut; 50 percent of the length of Type Np waters within partial-cut units is buffered.

Table 4. Covered lands area, estimated percentage of covered lands in high hazard unstable slopes, and area of high hazard unstable slopes on covered lands used in the assessment of “take” for the Forest Practices Habitat Conservation Plan.

	Covered Lands Area (acres)	Proportion of High Hazard Unstable Slopes (%)	High Hazard Unstable Slopes on Covered Lands (acres)
Western WA	6,072,043	5.9	358,251
Eastern WA	3,052,552	4.2	128,207
Total	9,124,595	5.3	486,458

Table 5. Riparian zones and unstable slopes areas (collectively referred to as “critical areas”) for the “minimal effects” and Forest Practices Habitat Conservation Plan (FPHCP) strategies used in the assessment of “take” under the Federal Endangered Species Act.

	Riparian Zone Area (acres)	Unstable Slopes Area (acres)	Total (acres)	FPHCP as a % of Minimal Effects
Minimal Effects Strategy				
Western WA	1,788,166	358,251	2,146,417	-----
Eastern WA	338,527	128,207	466,734	-----
Total	2,126,692	486,458	2,613,150	-----
FPHCP Strategy				
Western WA	1,335,771	358,251	1,694,022	79
Eastern WA	242,512	128,207	370,719	79
Total	1,578,282	486,458	2,064,740	79